

CLAIMS

What is claimed is:

1. A method for managing interlayer notification events in a hierarchical scheduler comprising:
  - receiving, in a layer engine, a request to transfer an entry from a child schedule to a parent schedule;
  - determining, by a real time event manager in the layer engine, whether to defer, via an entry in a deferral queue, the entry from the child schedule to the parent schedule;
  - and
  - recomputing, if the entry was deferred, whether to transfer the deferred entry, and if the recomputing indicates retaining the deferred event, transferring another entry from the child schedule to the parent schedule.
- 15 2. The method of Claim 1 further comprising computing a wakeup time, the wakeup time corresponding to the time at which the recomputing whether to transfer the deferred entry occurs.
3. The method of Claim 2 further comprising:
  - if the determining indicates deferring the entry, transferring, by the layer engine, the entry from the child schedule to the deferral queue; and
  - setting, in the realtime event manager, the wakeup of the child schedule at the computed wakeup time.
- 25 4. The method of Claim 1 wherein recomputing includes examining intervening entries in the child schedule, the intervening entries comprising entries arriving since the deferring.
5. The method of Claim 1 wherein each of the schedules comprise a set of states, the states indicative of an active state, in which the schedule is available to transfer an event,

an ineligible state, in which the schedule is pending a deferred entry from the child schedule, and an empty state, in which the schedule has no pending entries.

6. The method of Claim 1 wherein the request to transfer is a pop request indicative

5 of availability in the parent schedule, and deferring in the deferral queue further includes a deferral ack from the child schedule to the parent schedule in response to the pop request.

7. The method of Claim 6 wherein the pop request and the deferral ack further

10 comprise a state machine, the deferral ack establishing a deferral state in the child schedule, the deferral state retained by the child schedule until the redetermining.

8. The method of Claim 7 wherein the pop request initiates a pending push state in

the parent schedule, the pending push indicative of an available entry retained in the parent to receive an entry from the child schedule.

15 9. The method of Claim 1 wherein the deferral queue further comprises one deferred entry from the child queue.

20 10. A data communications device for managing interlayer notification events in a hierarchical scheduler comprising:

a layer engine operable to receive a request to transfer an entry from a child schedule to a parent schedule;

25 a realtime event manager operable to determine whether to defer the entry from the child schedule to the parent schedule; and

a deferral queue responsive to the realtime event manager and the layer engine and operable to store an indicator to the deferred entry, the realtime event manager further operable to recompute, if the entry was deferred as a result of determining, whether to transfer the deferred entry and, if the recomputing indicates retaining the deferred event, transfer another entry from the child schedule to the parent schedule.

11. The data communications device of Claim 10 wherein the realtime event manager is operable to compute a wakeup time, the wakeup time corresponding to the time at which the recomputing occurs.

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12. The data communications device of Claim 11 wherein, if the determining indicates deferring the entry, the layer engine is further operable to transfer the entry from the child schedule to the deferral queue, the realtime event manager being operable to set the wakeup of the child schedule at the computed wakeup time.

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13. The data communications device of Claim 10 wherein the realtime event manager is operable to recompute, by examining intervening entries in the child schedule, the intervening entries comprising entries arriving since the deferring.

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14. The data communications device of Claim 10 wherein the layer engine is a state machine, the child schedule and the parent schedule further comprising a set of states, the states indicative of an active state, in which the parent is available to transfer an entry, an ineligible state, in which the parent is pending a deferred entry from the child schedule, and an empty state, in which the child schedule has no pending entries.

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15. The data communications device of Claim 10 wherein the request to transfer is a pop request indicative of availability in the parent schedule, and if the entry was deferred as a result of determining, the deferral further initiates a deferral ack from the child schedule to the parent schedule.

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16. The data communications device of Claim 15 wherein the pop request and the deferral ack further comprise a state machine, the deferral ack establishing a deferral state in the child schedule, and the deferral state retained by the child schedule until the redetermining.

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17. The data communications device of Claim 16 wherein the pop request is operable to initiate a pending push state in the parent schedule, the pending push indicative of an available entry retained in the parent to receive an entry from the child schedule.

5 18. The data communications device of Claim 10 wherein the deferral queue further comprises one deferred entry from the child queue.

19. A method for managing interlayer notification events in a hierarchical scheduler comprising:

10 providing a hierarchical scheduler having a plurality of calendars, each of the calendars adapted to store entries corresponding to message packets;

identifying a parent schedule and a child schedule, the child schedule operable to push entries to the parent schedule in response to a pop request;

receiving, in a layer engine operable to transfer events between the calendars, an

15 indication of availability in the parent schedule to receive an entry from the child schedule;

issuing, from the parent schedule via the layer engine, a pop request to the child schedule;

20 transferring, if the child schedule is eligible; via a response to a pop request, an entry from the child schedule to the parent schedule;

deferring, if the child schedule is not eligible, an entry to a deferral queue, and retaining, in a real time event manager, via a deferral state, a pop response corresponding to the pop request; and

25 transferring, during the deferral state, an entry to the parent schedule, the transferred entry from either the deferral queue or the child schedule.

20. A computer program product having a computer readable medium operable to store computer program logic embodied in computer program code encoded thereon for managing interlayer notification events in a hierarchical scheduler comprising:

computer program code for receiving, in a layer engine, a request to transfer an entry from a child schedule to a parent schedule;

computer program code for determining, by a real time event manager in the layer engine, whether to defer, via an entry in a deferral queue, the entry from the child schedule to the parent schedule; and

computer program code for recomputing, if the entry was deferred, whether to transfer the deferred entry and, if the recomputing indicates retaining the deferred event, transferring another entry from the child schedule to the parent schedule.

10 21. A computer data signal for managing interlayer notification events in a hierarchical scheduler, comprising:

program code for receiving, in a layer engine, a request to transfer an entry from a child schedule to a parent schedule;

program code for determining, by a real time event manager in the layer engine, whether to defer, via an entry in a deferral queue, the entry from the child schedule to the parent schedule; and

program code for recomputing, if the entry was deferred, whether to transfer the deferred entry and, if the recomputing indicates retaining the deferred event, transferring another entry from the child schedule to the parent schedule.

20 22. A data communications device for managing interlayer notification events in a hierarchical scheduler comprising:

means for receiving, in a layer engine, a request to transfer an entry from a child schedule to a parent schedule;

means for determining, by a real time event manager in the layer engine, whether to defer, via an entry in a deferral queue, the entry from the child schedule to the parent schedule; and

means for recomputing, if the entry was deferred, whether to transfer the deferred entry and, if the recomputing indicates retaining the deferred event, transferring another entry from the child schedule to the parent schedule.

23. The data communications device of claim 10 wherein the deferral queue comprises a data structure operable to indicate, for each of the entries in the scheduler, an eligibility state and a deferral state, the eligibility state and deferral state indicative of an ability to push the entry from the child schedule to the parent schedule.
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24. The data communications device of claim 23 wheren the data structure further comprises an array of linked lists, each of the elements of the array corresponding to a readiness time indicative of the eligibility of the entries corresponding to that linked list.

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